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ABSTRACT

This study asks if occupational education bestows advantages or disadvantages on the students who pursue it, and how the educational experiences of occupational students compare to the experiences of students in academic programs. The authors used the Beginning Postsecondary Student Longitudinal Study of 1989-94 and 1995-98 to analyze educational outcomes of sub-baccalaureate occupational students. The findings suggest that occupational students pursuing an associate degree complete their degree goals less often than their academic counterparts. The gap remains after controlling for factors such as students characteristics and expectations. The authors conclude that the community college has yet to figure out and implement the optimal approach to providing direct occupational preparation within an institutional structure that rests on an academically oriented foundation. Findings indicate that the 3-year persistence rate for all students in the 1995-98 study was 55.9%, compared to 52.0% for occupational students, and 58.2% for academic students. Persistence includes academic students who are still enrolled, those who earned an AA or AS degree, and those who transfer to a four-year institution. Students who are still enrolled after 5 years are in an ambiguous category, having neither achieved their goals nor abandoned them. The authors conclude that failure to complete a degree or certificate program within 5 years is an indication of a problem. Attached are the PowerPoint print-outs for the presentation. (Contains 32 references and 6 tables.) (NB)

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The Educational Outcomes of Occupational Sub-baccalaureate Students: Evidence from the 1990s

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Abstract

One of the most debated issues about community colleges is their increased "vocationalization." Nowadays, occupational education constitutes the predominant program at sub-baccalaureate institutions, and occupational students have become the majority of these institutions' enrollments. However, little is known and understood about how the educational experiences of occupational students compare to those of students in academic programs. This paper uses the Beginning Postsecondary Student Longitudinal Study of 1989-94 and 1995-98 to analyze the educational outcomes of sub-baccalaureate occupational students. Our findings suggest that occupational students pursuing an associate degree complete their degree goals less often than their academic counterparts. Part of this difference can be explained by differences in student characteristics and expectations, but the gap remains after controlling for many of these factors. We then conclude that community colleges have yet to figure out and implement the optimal approach to providing direct occupational preparation within an institutional structure that continues to rest on a foundation oriented towards academic education.

I. Introduction

One of the most debated issues about community colleges is their increased "vocationalization." As Dougherty (1994) indicates, community colleges were originally oriented toward the provision of liberal arts education. Over the years this orientation changed and now vocational education constitutes the predominant program at community colleges. Critics of community colleges assert that the expansion of vocational education has affected negatively the educational attainment of community college students (Brint & Karabel, 1989; Dougherty, 1994; Karabel, 1972; Pincus, 1980). However, when discussing the effect of vocational education, researchers had focused on the impact that these programs have the educational attainment of academic and/or transfer-bound students (Anderson, 1984; Grubb, 1989; Velez, 1985). As a consequence, little is known and understood about how the educational experiences of occupational students compare to those experiences of students who are in academic programs.

Understanding the educational outcomes of occupational students is particularly important at this point in time when Congress is considering the reauthorization of the Carl D. Perkins Vocational and Technical Education Act of 1998. The Perkins legislation is designed to encourage and improve occupational education with a particular emphasis on such education at the sub-baccalaureate level. In evaluating the effectiveness of the current legislation and developing ideas for reauthorization, Congress needs to understand the educational and economic benefits that current occupational students enjoy. Compared to the alternatives available to them, does occupational education bestow advantages or disadvantages on the students who pursue it?

There is an extensive literature on postsecondary educational attainment, but few studies had focused on the educational outcomes of students at the sub-baccalaureate level. Then, the research on determinants of persistence and completion at the sub-baccalaureate level has been rather scarce and built upon studies focused on four-year institutions. For example, Anderson (1981) analyses college attrition and find that students who entered a two-year college were more likely to drop out in both the first and second years of college than students who enrolled initially at a four-year college, but her analysis is restricted to only community college students in academic majors. Pascarella and Terenzini (1991) indicate that attrition at a community college is a function of the relatively low levels of prestige that community colleges have and the absence of residence facilities, the first leading to a lack of student commitment to the institution and the latter having an inhibiting influence on student social integration. However, they do not provide evidence regarding how the characteristics and educational experiences of community college students affect their persistence and attainment. They also do not investigate how persistence and attainment of occupational students compare to those of academic students. Bers and Smith (1991) analyze persistence of community college students from an institutional perspective, using social and academic integration as main predictors. Their analysis is based on one community college and therefore the results cannot be generalized; however, these are informative. They find that students who work full-time are less likely to persist and that students who take courses with the purpose of receiving a degree or transferring are more likely to persist than those who take courses for job-related or personal enrichment reasons. A major shortcoming of Bers and Smith's (1991) analysis is that they do not study persistence of students in occupational programs, and neither do they study the interactions between selection of a program of study and the effect of enrolling with a particular purpose.

What does the research have to say regarding the effect of occupational education? Evidence from studies focused on four-year institutions seems to suggest that the net influence of the field of study on educational attainment is mixed (Astin, Tsui & Avalos, 1996; Pascarella & Terenzini, 1991), but studies have not focused on the impact of the field of study on the educational attainment of sub-baccalaureate students. Moreover, most of the research in educational attainment of community college students focuses on whether these colleges increase overall educational attainment and on whether they provide access to the bachelor's degree, without analyzing the effect of enrolling in an occupational major. (See for example Alba & Lavin, 1981; Dougherty, 1992; Leigh & Gill, 2002; Rouse, 1995, 1998; Velez, 1985; Whitaker & Pascarella, 1994.)

Then, in spite of the rich research on educational attainment of four-year students, the state of research about what affects completion at the sub-baccalaureate level, and particularly in certificate programs and occupational fields of study, remains scarce. This paper will fill part of this void by focusing mostly on students in certificate and associate programs, and by providing substantial evidence on the educational outcomes of occupational sub-baccalaureate students.

The paper develops as follows. In Section II, we discuss the datasets we make use of and we describe how we generate the different subpopulations of sub-baccalaureate students for our empirical analysis. In Section III we define persistence and completion and describe each group's educational outcomes. In Section IV we specify our empirical approach and describe the independent variables we use in our analyses and the composition of the groups of postsecondary students in terms of these features. In Section V we discuss thoroughly our findings. We also try to provide explanations for our finding that suggests that occupational students in associate

programs complete educational milestones less often than their academic peers. Finally, we summarize our findings and discuss policy implications in Section VI.

II. Description of Datasets and Subpopulations of Postsecondary Students

II.a. Datasets

The data for this analysis come primarily from two longitudinal studies conducted by the National Center for Education Statistics (NCES). The first is the Beginning Postsecondary Student Longitudinal Study (BPS89), which follows a sample of students who entered postsecondary school for the first time in 1989, from their enrollment through the 1993-94 academic year. Thus we can evaluate a student's progress in postsecondary education within a five-year window. We also make use of a second dataset, BPS96, which follows a sample of students who entered postsecondary education in 1995 through the 1997-98 academic year. Since this provides only a three-year window, it is not well suited for an analysis of college completion. Nevertheless, BPS96 does provide more recent data and it contains some interesting questions not found in the earlier BPS. Therefore, when we use BPS96, we analyze persistence rather than completion and argue that in order to complete, students must at least persist.

II.b. Subpopulations of Postsecondary Students

Our approach for studying persistence and completion consists of an analysis of successful completion of educational goals/objectives, and our focus on goals leads us to divide the sub-baccalaureate sample according to the stated goals of the students. We carry out separate analyses for groups with different goals for two reasons. First, the demographics characteristics

and goals of these groups differ significantly (Bailey et al., 2003). Second, we believe that the factors that determine successful goal attainment differ for those students who set out to earn a one-year (or less) certificate than for those who want an associate degree (AA/AS) or a bachelor's degree (BA/BS). Therefore, we divide the datasets into three mutually exclusive groups of sub-baccalaureate students: those with no stated degree goal, certificate goal, and associate goal. We classify students by combining information on the institution in which the student is enrolled, self-reported academic goals,[1] and institutionally reported program of study during the first year of postsecondary enrollment.[2] Our approach for generating these groups is slightly different from that of previous research in this area. For example, NCES (1997) analyzed degree attainment of students with different objectives, but when NCES researchers looked at community college students, they did not make distinctions between those with no degree goals from those with certificate or associate goals. Horn and Carroll (1996) analyzed persistence and attainment of non-traditional undergraduates, and even though they find that non-traditional students with diverse goals attain degrees at different rates, they did not divide the students into groups based on goals and level of enrollment when constructing their model for analyzing the determinants of degree attainment.

Then, the *no stated degree goal* group includes first-time enrollment sub-baccalaureate students who had missing degree goals or who reported not to be pursing a degree.[3] The *certificate group* includes first-enrollment sub-baccalaureate students who said that they were

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[1] The self-reported academic goals are derived in BPS89 from the variable GOAL8990. This variable captures the question "toward which type of degree are you working toward at this institution during the 1989-90 year?" Among the alternative answers are (i) not working towards a degree, (ii) vocational certificate/license, (iii) associate degree, (iv) bachelor's degree.

[2] We should remark that about one-fifth of first time beginners change their degree goals and that this change occurs mostly at the sub-baccalaureate level (Berkner et al., 1996). However, as we will shortly explain, we concentrate on the determinants of attainment of first-degree objective.

[3] Note that we exclude students with no stated degree goal from most of our analysis, although we will refer to them in some parts of our study.

pursuing certificates. Lastly, the *associate group* consists of students first enrolled in either two-year or four-year institutions who stated that they were attempting to earn an associate degree (72.9 percent) and all students in two-year institutions who stated that they were expecting to earn a bachelor's degree (27.1 percent).[4] The assumption in the latter case is that at most an associate degree may be obtained at a two-year school.

II.c. Who is an Occupational Student?

Within each of the groups discussed above, we identify those students in *occupational majors*. We use the categorization developed by Choy and Horn (1992) and, although students can change their majors, we use the first declared major to identify occupational students.[5] Table 1 displays the composition of each subpopulation of sub-baccalaureate students according to their first reported major, and it shows that among those who have declared a major, the large majority of certificate students are in occupational majors. About two thirds of associate students with declared majors are occupational, although we find that there is some difference between students in this group who aspire to an associate degree and those who want a bachelor's degree: community college students who aspire to a BA/BS are less likely than students who aspire to an associate degree to be in occupational fields.[6]

TABLE 1 HERE

[4] Sections II to IV rely chiefly on BPS89. When we make use of BPS96, we notify it explicitly.
[5] See the Choy and Horn (1992) categorization in the Appendix.
[6] From here on, we will consider for our analysis only the students with declared majors.

III. Defining Completion of an Educational Milestone

In order to simplify our analysis, given the complexity of educational goals, we establish a dichotomous definition of "completion" or "non-completion" for each of the two sub-baccalaureate groups that we use in our analysis. The BPS89 dataset tracks students for five years after their initial enrollment and students are considered to have met their goal if they complete their stated degree objective or a higher degree within the five years of data collection.[7] Transfer to a baccalaureate program is considered a "completion" even if no degree is earned. We realize that this is a generous definition of completion, especially for students at community colleges who state that they want a BA/BS degree. However, we use this weaker definition primarily because we suspect that many community college students who are on their way to earning a bachelor's degree do not have enough time to complete that degree within the survey time-frame. In any case, a successful transfer suggests that they have at least achieved an important milestone on the way to that degree and should be counted as an educational "success."

Students who are still enrolled at the end of five years are in an ambiguous category. Although they have not achieved their goal, they at least are still working towards that goal. This is not a problem for certificate students since only 2 percent are still enrolled by the end of the BPS89 coverage, while about one eighth of all associate students are still enrolled at the end of the survey period. We feel that five years is a reasonable amount of time for completion of a sub-baccalaureate degree, and that failure to complete a degree or even transfer within five years is an indication of potential problems.

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[7] Thus a student who is in the certificate group but completes an associate degree (and no certificate) would still be considered a "completer."

Thus certificate students are considered completers if, within the five years of survey coverage, they earn a certificate diploma, associate degree, or bachelor's degree or transfer to baccalaureate status. Students in the associate group are considered completers if they attain an associate degree, a bachelor's degree, or transfer to the baccalaureate level by the fifth year. Table 2 shows the observed rates of completion for the two groups of sub-baccalaureate students.[8] The first row (no degree/still enrolled) in each section of this table is an indication of the percentage of non-completers in each group.

Of the two groups, certificate students are the most likely to achieve their goal. We find that 48 percent of these students attain a certificate as their first degree and an additional 6 percent of certificate seekers go beyond their goal and have as first outcome an associate degree, a bachelor's degree, or a transfer up. Thus, about half of the students in this group achieve their goal. In a more negative light, almost one half of all certificate students fail to achieve their goal even though certificates usually take a year or less of study.

TABLE 2 HERE

In contrast, the members of the associate group show relatively low levels of degree goal achievement. Only 30 percent of associate students attain an associate degree (for nearly all of them, this is their first degree), but 13 percent transfer to the baccalaureate level *without* first attaining an AA/AS and an additional 2 percent directly attain a bachelor's degree.[9] Thus, about

[8] This table includes information only on the students' first degree (or transfer) that is considered as "completion" for their group. Therefore, if a certificate student earns a certificate *first* and then goes on to earn an AA/AS degree, we do not count the AA/AS. This table does *not* show all of the associate students who earned a BA/BS degree. Rather it shows all of the associate students who earned a BA/BS as their *first* degree.

[9] We presume that this group of direct BA/BS attainers consists of those students first-enrolled at a four-year institution who stated that they were working toward an associate degree. If they decide to go beyond their original expectations, this group does not need to transfer to attain the baccalaureate degree.

44 percent can be considered "completers" by our definition. But if we include students still enrolled at the end of the survey period as "completers", the associate group does almost as well as the certificate group. After five years, almost 8 percent of the associate group has at least a certificate and another 13 percent are still, we presume, pursuing a degree.

Do occupational and academic students attain their stated degree goal at the same rate? Table 2 indicates that occupational certificate students do considerably better than their academic peers. Forty nine percent of occupational certificates attain a certificate degree, while this is the case for only 31 percent of academic certificates. This is not very surprising, since 92 percent of the certificate students are in occupational fields. Thus, the certificate is, by its nature, an occupational degree and therefore we expect these students to achieve their goals more often. However, we can also suggest that this difference may be due to the greater benefits of an occupational certificate compared to an academic certificate, the latter being a degree not highly rewarded in the labor market (Grubb, 1997, 2002).

On the other hand, there are important differences between academic and occupational students among the associate group, and these differences do not favor occupational students. While 43 percent of academic associates fail to attain their educational goal, close to 62 percent of the occupational associates do not complete. Interestingly, in five years, 22 percent of academic associates compared to 42 percent of occupational associates have left with no degree of any kind. The analyses that follow will try to explain what accounts for this difference in attainment using a multivariate logistic approach.

IV. The Determinants of Educational Achievement

Research on determinants of persistence and degree attainment at the four-year level indicates that the timing and sequencing of the postsecondary experience have significant effects on the number of years of college completed. Delaying enrollment, working off-campus while enrolled, and interrupting enrollment have negative effects on the probability of bachelor's degree completion. Other important determinants of degree attainment are the student's pre-college academic records, living on or near campus, participating in extracurricular activities, and the availability of financial, educational and family resources such as receiving financial aid or coming from households of higher socioeconomic status (Astin, Tsui, & Avalos, 1996; Pascarella & Terenzini, 1991; Tinto, 1993). Then, we use this previous research on the determinants of completion of baccalaureate students as a base for the selection of the independent variables for this study.

IV.a. Empirical Approach

Our dependent variable, "completion" of a degree objective, is dichotomous and takes the values 0 for students who do not attain their degree goal and 1 for students who attain their degree goal or go beyond that goal. Therefore, the empirical approach used is a logistic regression. The logistic model is:

$$\text{Prob}(Y_i = 1) = \Lambda(\boldsymbol{\beta}' \mathbf{x}_i)$$

where

$$\Lambda(\boldsymbol{\beta}' \mathbf{x}_i) = \frac{e^{\beta' x_i}}{1 + e^{\beta' x_i}}$$

and where Y_i is the outcome variable, x_i is a vector of k covariates and β is a vector of coefficients for each group of sub-baccalaureate students (certificate or associate). It is important to note that, in contrast to the more common regression analysis, the parameters of the logistic models are not necessarily the marginal effects. However, we can compute these marginal effects, which provide us with a more straightforward interpretation of the effect of a change in one of the variables, holding the others constant. The marginal change in $\Lambda(\beta' x_i) = Pr(Y_i=1)$, given an incremental change in the value x_j of the jth covariate is:

$$\frac{\partial \Lambda(\beta' x_i)}{\partial x_j} = \beta_j \Lambda(\beta' x_i)[1 - \Lambda(\beta' x_i)]\beta$$

We present the two measures, coefficients and marginal effects, because it allows for a complete understanding of the determinants of educational attainment.

Our analysis focuses on differences between occupational and academic students in the probability of attaining educational objectives. One interpretation of this analysis could be that we are asking whether enrollment in an occupational (or academic) program increases or decreases a student's likelihood of attaining his or her objective. In other words, would encouraging students to enroll in occupational programs lead to higher (or lower) completion rates? The problem with answering this question is that students are not randomly assigned to occupational or academic programs and therefore any differences in completion rates might result from initial differences rather than any influence of the program itself. We address this problem by controlling for observable student characteristics. However, we do not take account of unobservable initial differences between academic and occupational students. There are techniques to address this problem, but they require the use of variables that influence the student's choice of programs without influencing the likelihood of completion (Card, 1999; Greene, 2000; Griliches, 1977; Heckman, 1979; Willis & Rosen, 1979), but we do not have

available variables that plausibly meet this requirement. On the other hand, many analysts use student academic skills and socioeconomic status (SES) to control for this type of selection bias and we do have measures of SES, although the measures of initial academic skills are weak in the BPS89 dataset. (See the discussion of the independent variables below.) In the end, the possibility that initial differences might influence any variation in outcomes for occupational and academic students needs to be considered in the interpretation of our results.

IV.b. What Determines Educational Attainment?

As shown on Table 2, the two populations of sub-baccalaureate students have different completion rates. But we presume that there is also significant variation in completion within each of these groups, and our analysis tries to find characteristics that either promote or thwart educational attainment. We are particularly interested in understanding why occupational students in the associate group are less likely to achieve their educational goals, and therefore we want to check whether occupational students simply have more of those characteristics that discourage college completion. Our empirical models slightly differ for each group of sub-baccalaureate students;[10] however, each model includes a dummy variable that indicates whether the student was in an occupational program. This variable will receive much of our attention, since the main purpose of this paper is to estimate the effect of being an occupational student.

In addition to the occupational dummy, we include four sets of independent or control variables. The first set contains the demographic characteristics of the student, such as an indicator for gender (with male is the reference group), race/ethnicity dummies (white is the reference), an indicator for disabilities of any type (no disabilities is the reference), and the

[10] We estimated five models for each group of postsecondary students, in which we introduce different controls in a stepwise manner. Given space limitations, in this paper we show and discuss the results from two specifications only. Results from the other models are available from the authors upon request.

student's age at first enrollment (a dummy variable indicating that the student was 26 years old or older when first enrolled).[11]

The second set of independent variables includes the family composition and socioeconomic status of the student. We control for marital status when first enrolled, for having a child when first enrolled, for the highest educational level of the parents (with high school or less as the reference group), for whether the student was a dependent in the 1989-90 academic year, and for the logarithm of 1988 total household income (for dependent students we consider parental income and for independent students, their own income).

The third set of controls includes variables that relate to the educational background of the student. BPS89 has poor information regarding educational background, and at most we can control for having obtained a General Education Development (GED) diploma and for having enrolled in at least one remedial course. These variables do not necessarily pick up lower academic skills, particularly when many certificate and occupational associate programs do not require remediation even though they generally attract students with low educational achievement.

The final set of independent variables includes what we refer to as pathway features. By pathways, we mean the timing and sequencing of the postsecondary experience—whether the student interrupts enrollment, attends part-time, or works while enrolled. These pathway variables are specific to each group of sub-baccalaureate students. Since BPS89 has rich monthly enrollment information, we use indicators for high levels of cumulative full-time

[11] We did a non-linearity test for different dummies indicating age when first enrolled. This test suggested that students 26 years old and older were different from younger students.

enrollment,[12] an indicator for whether the student interrupted enrollment or not, and indicators for two different levels of working while enrolled.[13] Findings from previous research indicate that we should expect more full-time enrollment to promote retention and completion, while interrupting enrollment and working while enrolled are expected to reduce completion (Adelman, 1999; Berkner et al., 1996; Horn & Carroll, 1996; Horn & Premo, 1995; NCES, 1997).

The five-year limit of our dataset creates a potential problem for this analysis: a part-time student, or one who interrupts enrollment, simply has less time within the five-year window to achieve his or her goal. It is possible that a student who interrupts for one year has exactly the same probability of finishing, but will simply take one year longer. However, in our time-limited dataset, the data collection period may end while that student is still enrolled and we would conclude that he or she did not complete. We refer to this problem as the *direct* effects of the pathway variables. But we would also like to know whether interruptions or part-time attendance have additional effects of thwarting enrollment by disrupting students' education and making it more difficult for them to concentrate on their studies and thereby complete their degree. This we refer to as the *indirect* effects of the pathways features. We control for direct and indirect pathway effects by introducing in our model the number of full-time-equivalent

[12] For the certificate group we include one variable that indicates full-time enrollment more than 50 percent of the time. For the associate group we use two indicators, one for between 25 percent and 75 percent of full-time enrollments and another for enrollments that are more than 75 percent full-time.

[13] The indicators for working while enrolled are one for working between 25 percent and 75 percent of the enrollment time, and the other for over 75 percent of the enrollments. One would expect full-time enrollment to be negatively correlated with working while enrolled. To test this assumption, we computed the correlation coefficients (matrices not shown here and available from the authors upon request). For the certificate group, only the correlation coefficient between the intensity dummy and the dummy for working more than 75% of the enrollment time is negative and not very high (-0.17). For the associate group, the only correlation coefficient that is negative is for full-time enrollment and working while enrolled (-0.09), but it is a low correlation. Then, we can conclude that full-time enrollment is only weakly negatively correlated with working while enrolled, contrary to our expectations.

(FTE) semesters for which a student is enrolled.[14] For example, suppose that of two students who complete four semesters of school, one does it in two years continuously and the other in four years with interruptions. Does the interrupter face a greater risk of non-completion? We might explain an *indirect* effect as a consequence of incoherence in a "drawn out" program of study or as the effect of loss of continuity (retaking of courses, poor grades because the prerequisite material is not "fresh" in the student's mind). Whatever the mechanism, these are *indirect* effects of pathways and they have a different interpretation and potential impact from a policy perspective.

IV.c. Descriptive Statistics of the Two Groups of Sub-baccalaureate Students

Table 3 shows the descriptive statistics of the two sub-baccalaureate groups. We find that the certificate group is characterized by a larger number of minorities and historically underrepresented students. The percentage of females, Blacks and older students is considerably higher in the certificate than in the associate group. Certificates are also the group most likely to have a child and to be non-single when first enrolled, they come from a relatively disadvantaged background by SES measures, and they are more likely to have a GED. On the other hand, associate students are less likely than their certificate counterparts to enroll in occupational majors. However, associates are more likely to interrupt enrollment, to attend part-time, and to

[14] The measure of full-time-equivalence was constructed in the following way from the "intensity" variable ENRyymm. We assigned a weight of 1 (or 100%) to the months with full-time attendance intensity. Months with part-time intensity were given a weight of 0.5 (or 50%), and enrollment months with less-than-part-time intensity were weighted as 0.25 (or 25%). There are students for whom intensity of enrollment was missing for some months. These months were given a weight of 0.75 (or 75%). This weight was assigned based on a secondary variable (MNSTAT1 through MSNTAT12), which includes enrollment and working intensity. A cross-tabulation between this secondary variable and the main one indicated that most of students with missing intensity tend to indicate "full-time enrollment with no employment" or "full-time enrollment with employment." We also need to remark that we use the square root of the number of FTE semesters. The square root was chosen both to reduce the skewness of that variable and because it captures the diminishing effect of FTE semesters at higher values. The latter was indicated in models employing both the FTE semesters and its square.

have high levels of working while enrolled.[15] Differences in these pathway characteristics may help explain why associate students are less likely to attain their educational goals.

TABLE 3 HERE

Within each of these two groups, do occupational students stand out as unique? Here we focus on the associate group since, as we have seen, occupational students comprise the overwhelming majority of certificate students. Furthermore, among the associate group, the occupational students are less likely to attain an AA/AS degree, less likely to transfer to a baccalaureate program, and more likely to leave college with no degree or certificate. Table 3 also compares the characteristics of occupational and academic students in the associate group. Occupational students tend to be older, are more likely to be married, and are less likely to be dependent as compared to their academic peers. They are additionally more likely to have a GED but less likely to have taken remediation.[16] Occupational students are less likely to attend full-time and, on average, have accumulated fewer FTE semesters than their academic counterparts. Therefore, occupational students in the associate group do tend to have characteristics (particularly delayed enrollment, part-time intensity and family responsibilities) that are associated with lower retention and completion rates.

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[15] It is important to remark that a substantial proportion of certificate students have full-time attendance, low levels of interruptions and a higher percentage of students with low levels of working while enrolled. We expected this group to be interested in obtaining job-related skills and credentials, but they apparently do so during a break from employment more often than might be expected.

[16] This illustrates why incidence of remediation is a poor measure of academic preparedness. We would expect occupational students to be less well prepared, but occupational programs in community colleges are less likely to require remediation for under-prepared students. Therefore, the incidence of remediation confuses differences in student preparedness with differences in program entry requirements.

V. Discussion of Findings

Table 4 shows the results of our logistic estimations for the two groups of sub-baccalaureate students. We discuss each group separately in the following sub-sections.

TABLE 4 HERE

V.a. Results for the Certificate Group

As we can see, few variables have a statistically significant effect on the educational attainment of certificate students.[17] When we exclude the pathway features, only being a dependent and the logarithm of total income have significant effects, both positive, on the probability of completing at least a certificate degree. Once the pathway features are included, being married when first enrolled is the only background variable that exerts a significant, although negative, effect. The loss of significance of the income and dependency status variables is not surprising. Students from higher income families and who are dependent from their parents' income can attend college in a "more traditional" fashion–not interrupting, enrolling full-time, and not needing to work while enrolled. Then, the pathway variables could be absorbing most of the variance that comes from the SES background differences and making the latter insignificant.

The variables that have the largest effects are those related to the timing and sequencing of the postsecondary educational experience. All the pathway variables, with the exception of

[17] In this model, we exclude Native Americans. The reason is that there are only a small number of students in this ethnic group. For comparison purposes with the other groups, we re-estimate the same models with the Native American covariate (results not shown here), and found that this variable has no significant effect in the first model. In models two to five, being Native American predicts failure perfectly, so the covariate is automatically dropped by STATA™ and the observations with that characteristic are not used.

the "middle" working category, are significant. Interrupting enrollment has a strong negative *indirect* effect, and certificate students who interrupt have a probability of completion 37.4 percent lower than that of those who enroll without interruptions. The highest category of working while enrolled has also a negative effect on the probability of completion. The measure of accumulated FTE semesters has the expected positive effect. Having two FTE semesters of enrollments instead of one increases the estimated probability of educational success by 20.4 percent, but increasing FTE semesters from two to three augments this probability by only 15.7 percent. This is a *direct* effect: going to school longer increases a student's chance of completing *something*. This effect is also indication that accumulating FTE semesters increases the probability of success but in a diminishing fashion. One unexpected result is that having a majority of full-time enrollments actually marginally decreases the estimated probability of educational success.[18]

Whether certificate students are in an occupational major or not has no influence on their probability of attaining their educational goals. This is probably caused by three factors. First, the distinction may not be meaningful for students at this level. The distinction between academic and occupational majors at the associate level is closely related to a student's interest in transferring, but most certificate students do not expect to transfer. Second, the Choy and Horn occupational/non-occupational categorization was developed primarily with two-year programs in mind, and therefore it may be less relevant to certificate students. Finally, over 90 percent of the certificate students are in occupational majors, and as a result there simply may

[18] We find that full-time enrollment decreases the probability of completion primarily for students who both interrupt and work a large percentage of their enrollment time. The negative full-time effect can then be interpreted as being driven by differentials that appear when the student has been around much more time than is traditionally expected in his or her program.

not be enough academic (or even non-occupational) students in the certificate group to have a significant impact on outcome differentials.

V.c. Results for the Associate Group

In contrast to the certificate group, a larger number of variables affect significantly the outcome. Being female and being Black have significant effects, the first positive and the latter negative, on the probability of an associate student's educational attainment. Having a parent with at least a BA/BS degree and being a dependent have significant and positive effects on educational completion, but as in the case of certificates, these SES effects fade away once we control for pathway features. The same explanation can account for this lose in significance: students from more educated households and who are dependent on their parents' income can attend college in a "more traditional" fashion, so then the pathway variables would be absorbing most of the variance that comes from the differences in SES background.

All the pathway variables, with the exception of the dummies for working while enrolled, have significant effects on associate students' probability of completion. Enrolling full-time increases *indirectly* the estimated probability of completion by 28.3 and 34.9 percent (for middle and high levels of full-time intensity, respectively). Interrupting enrollment reduces *indirectly* the probability by approximately 10.7 percent. However, we find that associate students who work, even those who work during most of their postsecondary enrollments, do not have a have a lower probability of achieving their educational goals. We are controlling for part-time status, so if working causes students to go part-time, then their chances of completing their degree objectives will fall. We speculate that the problem is then with the part-time status and not with the work. Lastly, and as expected, accumulation of FTE semesters has a positive and significant

direct effect. Having two FTE semesters of enrollment instead of one increases the probability of success by 9.7 percent, but increasing FTE enrollments from two to three semesters augments the estimated probability by 7.4 percent. The accumulation of FTE enrollments increases the probability of success, but in a diminishing fashion.

The most important finding overall is about occupational status. The results suggest that occupational students have a lower probability of achieving their educational goals. Even after controlling for demographic, educational, socioeconomic, and pathway variables, occupational students in the associate group have a lower probability of attaining their educational goals than their academic peers. Certainly some of the average differences observed in Table 3 can be accounted for by differences in the background characteristics and pathways. Occupational students are more likely to be older, to come from lower SES households, and to have more family responsibilities. Most of these factors reduce the probability of educational success, but the gap remains even after taking account of these differences.

V.d. Alternative Explanations for the Occupational-Academic Associate Completion Gap

Given the relative strength of the effect of being an occupational student, we extend our analysis in four ways to try to explain why there is a negative effect of enrolling in an occupational major. First, we test whether there are important differences between students in this group who aspire to a bachelor's degree and those who seek an associate degree. In order to do this, we add a variable indicating which degree the student was seeking.[19] The coefficient for this variable is not significant and including it has only small effects on the size but does not alter the significance of the other coefficients.

[19] Results are not shown here and are available from the authors upon request.

Second, we test whether the occupational effect varies when changing the definition of completion to include the attainment of a certificate and to exclude the transfer to a four-year institution.[20] We find that occupational students are still significantly less likely to attain a degree of any type, and the magnitude of the negative effect is reduced slightly to -10.1 percent.

In third place, we carry out an additional analysis to determine whether the determinants of success are different for transferring and for completing an associate degree. In our analysis so far, associate students are considered completers either if they attain an associate degree *or* transfer. In order to differentiate between transfer and associate degree completion, we carry out a multinomial logistic regression which differentiates among more than two outcomes—in this case, transfer/BA/BS attainment, AA/AS attainment, and neither (either continued enrollment or non-enrollment).[21] We conclude that the negative effect of being occupational seems to be mostly driven by the lower probability of transferring or attaining a BA/BS for occupational students. The occupational enrollment effect is negative for both transfer and AA/AS attainment, but it is not significant for AA/AS attainment.

A final possible explanation for the lower completion rates of occupational associate students is that these students are not seeking degrees, but rather attending a community college to learn specific job skills. In many cases, these students may learn those skills before completing a degree or certificate. After all, the underlying notion of an occupational major is that it is more closely tied to particular jobs or occupations. The hypothesis that occupational students have different objectives can be tested using data from BPS96, which includes a

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[20] Results are not shown here and are available from the authors upon request.

[21] In this multinomial logistic model, two "positive" outcomes (associate degree vs. transferring or achieving a bachelor's degree) compete and are modeled using the same set of covariates (results are not shown here and are available from the authors upon request). From this analysis, we claim that the factors that affect educational attainment vary by the type of outcome considered. The positive effect of being female holds only for the attainment of an AA/AS degree, while being Black affects negatively the transfer/BA/BS attainment process. Additionally, the pathway effects are much less important for the transfer process.

variable that is available only for students enrolled at a two-year college, which asks about "the primary reason for enrolling at that school."[22] We assume that students who enroll with the purpose of acquiring job skills would be less likely to complete a degree and that they are concentrated mostly in occupational majors.

In order to understand the effect of having different purposes upon postsecondary enrollment, we run a logistic regression that has as outcome a dichotomous indicator for three-year persistence[23] and that includes, in addition to the controls used in the completion analysis, a set of dummies indicating diverse reasons for enrolling (enrolling with "degree/transfer" purposes is the reference category). The findings indicate that citing job skills significantly reduces the probability of persistence by 18.1 percent, and that citing personal enrichment does not significantly affect a student's retention in college.[24] On the other hand, controlling for these reasons for enrolling does not influence the effect of occupational enrollment status. Although in neither case (with or without reasons for enrollment) is the coefficient on occupational status statistically significant, the point estimate actually goes up slightly when the reasons-for-enrolling controls are added. This suggests that while occupational students may have somewhat different motives for enrolling, controlling for these reasons would not explain the gap between academic and occupational completion rates that we found in our completion analysis.

V.e. Other Extensions in the Analysis of Occupational Associate Students

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[22] The reasons-for-enrolling variable is XANPPURP, and among the alternative answers a student can declare (i) job skills, (ii) degree attainment/transfer, and (iii) personal enrichment.

[23] Since BPS96 has only three years of data, we need to use persistence instead of completion as the outcome variable. For this purpose, we define a *persister* as a student who either is still enrolled by the end of the third academic year, independently of whether he she interrupted her enrollment or not, or who attained at least an associate degree or transferred up by that time

[24] Results are not shown here and are available from the authors upon request.

In this section, we extend the analysis of occupational associate students by looking at persistence rates. More specifically, we would like to study whether persistence rates have experienced an increase or a decrease during the 1990s. Since for a trend analysis we need to use the more recent BPS96, which has only three years of data available, we analyze persistence and argue that it is a requirement for completion. Thus, for this extension we utilize the definition of *persister* applied in the reasons-for-enrolling analysis of the previous section.

So, are occupational associates during the mid-90s more likely to persist than those who started postsecondary education in 1989-90? Table 5 displays the three-year persistence rates for associate students. The overall associate persistence rate of 1989-90 is 59 percent, which slips to 56 percent for the 1995-96 entrants. Compared to 1989-90 entrants, fewer associate students who entered postsecondary education in 1995-96 completed their associate degrees within three years, but slightly more transferred to a baccalaureate program or earned a bachelor's degree.

TABLE 5 HERE

The data on occupational and academic students suggests that this deterioration in three-year persistence rates is due entirely to the decreased persistence of academic students. Occupational students from the BPS96 sample persist at the same rate as they their occupational counterparts from the BPS89 sample. On the other hand, the overall persistence drops significantly for academic students, with a large decrease in the proportion of these students who earned an associate degree. Thus, this comparison over time indicates that persistence rates for occupational associate students do not deteriorate, while they do for academic students.

We additionally run a logistic regression to determine whether there are significant differences in persistence rates between academic and occupational students once we control for diverse factors.[25] Results indicate that the most noteworthy and relevant difference between the BPS89 and BPS96 samples is the significant negative effect that enrolling in an occupational field of study (as opposed to in an academic major) has on the BPS89 data. Notably, but expected from the analysis of Table 5, this effect is no longer significant when using BPS96 data.

Since the interest of this paper resides in analyzing the educational outcomes of occupational sub-baccalaureate students, the finding that the occupational effect becomes insignificantly negative throughout the 1990s appears to be a positive trend and may imply that occupational students are catching up to their academic peers in educational persistence and attainment. However, persistence rates shown in Table 5 indicate otherwise: that between the BPS89 and BPS96 surveys, rather than occupational students exhibiting increased rates of retention, academic students' rates have declined. Therefore, the lack of significant effect of a student's major (occupational or academic) in BPS96 is due to a convergence in persistence rates, as the retention rates of academic students falls to more closely match the lower rate of their occupational peers.

What might explain this deterioration in the persistence rates for academic sub-baccalaureate students? During the period between the two surveys, the gap between the earnings of high school students and BA/BS holders grew significantly (Murphy & Welch, 2002). It is not surprising that during the 1980s and early 1990s the share of high school students who stated that they aspired to a bachelor's degree also increased. Such students are either likely to enroll directly in a baccalaureate program or to enroll in an academic, transfer-oriented program at a community college. Thus, it is possible that those students who were most

[25] Results are not shown here and are available from the authors upon request.

convinced that they wanted a bachelor's degree tended to shift their enrollment from community colleges to four-year institutions. Since these students may be more certain of their goals, they may also be more likely to persist and complete, and therefore their shift to four-year institutions would leave less directed students in community colleges' academic programs. Second, the overall emphasis on earning a BA/BS degree may have also encouraged more marginal high school students to enroll in higher education, and these students would be more likely to start at a community college. If their goal were to attain a BA/BS degree, then they would probably enroll in an academic program. Both factors would suggest that the overall level of academic preparation of community college's academic students weakened during the early 1990s, and this might explain the deterioration of persistence rates during that period.

VI. Conclusions and Policy Implications

Community colleges have long been criticized for "cooling out" the educational aspirations of their students by sidetracking them into vocational and terminal programs. Moreover, critics of the two-year colleges contend that the increased offering of vocational programs is to be held responsible for the baccalaureate completion rates of students in transfer-bound programs. Analysis of recent national datasets indicates that an increasing number of community college students enroll in occupational-oriented certificate programs and that the majority of students in associate programs enroll in occupational majors. Additionally, a large percentage of sub-baccalaureate students indicate that they enroll with the purpose of enhancing their job skills. Thus, the occupational-oriented student, who was considered to be the "other" student at the community college, has become the modal student.

Our paper has therefore contributed to the field of higher education by analyzing the educational outcomes of this often forgotten majority. In doing this analysis, we first measured educational achievement relative to the student's stated educational goals and divided all sub-baccalaureate students into two groups: students pursing a certificate, and an associate degree. We the used Choy and Horn (1992) categorization of *occupational* students to distinguish between programs that prepare them more or less directly for a well-defined occupation (occupational majors) and programs that provide a somewhat broader education with a stronger general education or academic component (academic majors).

The effect of being an occupational student differed depending on the student's degree goal. We found that it had no influence on the educational success of certificate students, although this was not surprising since the large majority of certificate students enroll in occupational majors. By its nature, the certificate is a diploma focused on preparation for a specific occupation. On the other hand, we found that occupational students in the associate group have a significantly lower probability of achieving their educational goals than academic students, effect that remained even after controlling for socioeconomic, educational, demographic, and pathway characteristics. Another significant finding regarding the effect of occupational education was that the gap between the completion rates of occupational and academic associates appeared to have declined between the end of the 1980s and the mid-90s, although we had to make this judgment based on persistence rates rather than completion rates. However, the convergence between academic and occupational associates did not result from an improvement in persistence and completion among occupational students, but rather from deterioration in those rates for academic students.

What might explain the lower persistence and completion rates for occupational students in associate programs? We shall consider three alternative explanations: 1) Occupational students have weaker skills and are less well informed than their academic peers. 2) Occupational students are less interested in earning degrees than academic students. 3) Community colleges work less effectively with occupational students. Each of these explanations has different policy implications.

The first explanation suggests that occupational students might have weaker academic skills and might be less well informed than their academic peers. We controlled for differences in academic skills, but the BPS datasets have weak measures of academic preparation. For example, the incidence of remediation is a weak measure since many occupational programs do not require remediation for students who fail assessment tests, and controlling for whether the student earned a GED misses the tremendous variation in preparation among students with a regular high school degree. In any case, what policies does this explanation imply? Better high school preparation would be important but, short of that, policies that do a better job of informing potential occupational students about the academic demands of college would also be crucial. It could be the case that many students enter postsecondary occupational programs because they believe that they have fewer or weaker academic requirements. Indeed, many occupational programs do have weaker academic prerequisites and are less likely to require remediation for students with deficient academic skills. Given the lower completion rates for occupational students, a policy that does not require remedial help for these students seems misguided. Therefore, in addition to improving preparation in high school and better informing high school students about the demands of college, community colleges need to strengthen their remediation requirements and improve the delivery of that remediation.

A second possible explanation for the low completion rates of occupational associate students is that these students do not want degrees. This hypothesis was explored by Bailey et al. (2003), who found that occupational students were more likely than academic students to cite job skills rather than earning a degree or transferring as their primary reason for enrolling. In this study, we found that community college students who cited jobs skills as their primary objective for enrolling were significantly less likely to complete three years of, interrupted or uninterrupted, postsecondary education. Therefore, the purposes for enrolling at community colleges may explain part of the low completion rates for occupational students, but our analysis also indicated that including variables for reasons for enrolling did not influence the persistence gap between academic and occupational students.

A last explanation for the differences in persistence and completion between occupational and academic students is that the colleges in some way work less effectively with occupational students. For example, Grubb (1996) argues that the academic model, values, and processes more consistent with an academic oriented education still dominate community colleges. Therefore, institutional support in community colleges may be less than optimal for occupational students, even though occupational students constitute the majority of the student body at these colleges. Perhaps more effective pedagogy, advising, or other student services need to be different for occupational students. Although this is a plausible hypothesis, testing it would require more fine-grained information on differences between the college experiences of academic and occupational students.

Summing up, associate occupational students achieve their stated goals less often than academic students, while such a difference is not found for students in certificate programs. Part of the academic-occupational gap can be explained by differences in student characteristics and

expectations, but the gap still remains after controlling for many of those factors. Our research therefore suggests that community colleges have yet to figure out and implement the optimal approach to providing direct occupational preparation within an institutional structure that continues to rest on a foundation oriented towards academic education.

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Table 1: Sub-baccalaureate Students and Fields of Study

	Occupational	Academic	Undeclared/Missing
No Degree Goal	30.93%	45.44%	23.63%
Certificate	80.34%	7.08%	12.58%
Associate	51.75%	25.45%	22.80%
AA/AS Goal	55.21%	23.14%	21.65%
BA/BS Goal	42.98%	31.64%	25.38%

Source: Authors' estimates based on Beginning Postsecondary Student Longitudinal Study 1989-1994.

Table 2: Degree Completion of Sub-baccalaureate Students

Attainment of Stated Goal[1]

Certificates	All	Occupational	Academic
No degree/still enrolled	46.75%	45.95%	--[2]
Still enrolled in last period	2.25%	2.10%	low n
No degree and no transfer	44.50%	43.85%	53.03%
Certificate	***47.74%***	***49.11%***	***30.60%***
Associate Degree	3.46%	3.07%	8.03%
Transfer to Baccalaureate Level	1.24%	1.08%	3.12%
Bachelor's Degree	0.82%	0.79%	low n

Associates	All Associates			AA/AS Goal			BA/BS Goal		
	All	Occupational	Academic	All	Occupational	Academic	All	Occupational	Academic
No degree/still enrolled/certificate	55.63%	61.77%	43.16%	58.16%	63.33%	47.17%	48.85%	56.91%	35.00%
Certificate (and no higher event)	7.86%	8.77%	5.82%	9.87%	10.28%	8.68%	2.47%	4.07%	0.00%
Still enrolled in last period	12.73%	11.23%	15.54%	10.14%	9.65%	11.26%	19.70%	16.12%	24.23%
No degree and no transfer	35.04%	41.77%	21.80%	38.15%	43.40%	27.23%	26.68%	36.72%	10.77%
Associate Degree	***29.57%***	***25.69%***	***38.02%***	***31.92%***	***26.81%***	***43.04%***	***23.27%***	***22.24%***	***27.82%***
Enroute Certificate (plus AA/AS)	0.70%	1.04%	0.00%	0.90%	1.28%	0.00%	0.18%	0.30%	0.00%
Associate Degree (first event)	28.87%	24.65%	38.02%	31.02%	25.53%	43.04%	23.09%	21.94%	27.82%
Transfer to Baccalaureate Level	12.88%	10.86%	16.54%	8.28%	8.03%	8.61%	25.26%	19.63%	32.62%
Bachelor's Degree	1.90%	1.68%	2.30%	1.64%	1.82%	1.18%	2.61%	1.23%	4.56%

Source: Authors' estimates based on Beginning Postsecondary Student Longitudinal Study 1989-1994.

[1] Attainment of stated goal refers only to the lines in italics and bold. [2] Since the number of academic certificates that are still enrolled is below the threshold for publication of confidential data, we cannot compute the percentage of academic certificates with a no degree/still enrolled outcome.

Table 3: Descriptive Statistics for Certificates and Associates

Covariates	Certificates	Associates		
		All	Occupational	Academic
Educational Attainment - Outcome	***53.23%***	***44.36%***	***38.24%***	***57.03%***
	(.035)	(.026)	(.028)	(.049)
Demographics				
Female	60.19%	51.09%	51.80%	49.63%
	(.037)	(.027)	(.030)	(.053)
Black	13.35%	9.27%	10.07%	7.60%
	(.027)	(.016)	(.020)	(.027)
Hispanic	6.89%	10.06%	9.26%	11.70%
	(.019)	(.020)	(.019)	(.044)
Asian	4.02%	2.95%	2.93%	2.99%
	(.014)	(.008)	(.010)	(.014)
Native American	0.04%	0.97%	0.47%	2.01%
	(.000)	(.005)	(.004)	(.012)
Has any disability	10.69%	7.57%	7.51%	7.70%
	(.018)	(.012)	(.014)	(.024)
26 years old or older in 1989	26.62%	12.70%	15.44%	7.02%
	(.030)	(.016)	(.022)	(.021)
Family and SES Background				
Ever married when first enrolled	36.53%	16.82%	20.39%	9.44%
	(.032)	(.020)	(.025)	(.029)
Has children when first enrolled	34.86%	12.97%	15.89%	6.94%
	(.035)	(.015)	(.020)	(.023)
Parent Ed: some college	22.79%	21.95%	24.59%	16.51%
	(.027)	(.019)	(.024)	(.028)
Parent Ed: BA or higher	11.57%	29.16%	26.83%	33.99%
	(.020)	(.022)	(.025)	(.046)
Dependent in 89-90	34.35%	57.53%	52.79%	67.32%
	(.030)	(.023)	(.027)	(.041)
Ln of 1988 total income	9.7195	10.1779	10.1483	10.2392
	(.057)	(.046)	(.050)	(.081)
Educational Background				
GED	15.15%	6.33%	7.05%	4.85%
	(.023)	(.013)	(.016)	(.021)
Took remediation courses	13.61%	19.74%	17.97%	23.40%
	(.023)	(.019)	(.022)	(.037)
Occupational major	92.42%	67.41%	--	--
	(.021)	(.030)	(--)	(--)

continued on next page

Table 3, Continued: Descriptive Statistics for Certificates and Associates

Covariates	Certificates	Associates		
		All	Occupational	Academic
Pathways				
Mid-level intensity[1]	--	27.26%	24.06%	33.89%
	(--)	(.022)	(.024)	(.036)
High level intensity[2]	60.14%	52.19%	50.80%	55.08%
	(.036)	(.026)	(.031)	(0.040)
Interruptions	13.36%	35.50%	35.43%	35.65%
	(.022)	(.027)	(.028)	(.046)
Mid-level working while enrolled	18.97%	27.62%	26.35%	30.25%
	(.021)	(.023)	(.026)	(.041)
High level working while enrolled	48.34%	56.32%	57.38%	54.12%
	(.033)	(.027)	(.031)	(.051)
FTE semesters	2.2722	4.4616	4.0209	5.3732
	(.105)	(.136)	(.152)	(.236)
FTE semesters (square root)	1.4072	2.0021	1.8900	2.2339
	(.036)	(.034)	(.039)	(.058)
Unweighted observations	678	871	639	232

Source: Authors' estimates based on Beginning Postsecondary Student Longitudinal Study 1989-1994.
Standard errors in parenthesis.

[1] Mid-level intensity is defined only for associate students and indicates full-time intensity attendance between 25% and 75% of the enrollment time. [2] High level intensity indicates full-time attendance of at least 75% of the enrollment time for associates, and of 50% for certificates.

Table 4: Results from Logistic Regressions
Dependent Variable is "Completion of Degree Goal"

Independent Variables	Certificate Students				Associate Students			
	Without Pathways		With Pathways		Without Pathways		With Pathways	
	Coefficient	Mg. Effect	Coefficient	Mg. Effect	Coefficient	Mg. Effect	Coefficient	Mg. Effect
Occupational	***0.4421***	***0.1101***	***0.8238***	***0.1998***	***-0.7017****	***-0.1726****	***-0.4482****	***-0.1086****
	(.5389)	(.1328)	(.7872)	(.1772)	(.2408)	(.0587)	(.2466)	(.0600)
Demographics								
Female	0.1013	0.0253	-0.0084	-0.0021	0.5126**	0.1250**	0.5491**	0.1309**
	(.2558)	(.0638)	(.3073)	(.0768)	(.1999)	(.0480)	(.2213)	(.0513)
Black	-0.3845	-0.0958	-0.4246	-0.1049	-1.1708**	-0.2502**	-0.8449**	-0.1823**
	(.3475)	(.0859)	(.3705)	(.0904)	(.3988)	(.0689)	(.4292)	(.0799)
Hispanic	-0.3095	-0.0772	0.1842	0.0460	-0.3659	-0.0873	-0.5343	-0.1210
	(.5987)	(.1486)	(.5721)	(.1422)	(.3678)	(.0844)	(.4874)	(.1016)
Asian	0.9181	0.2109	0.3053	0.0758	0.6483	0.1606	0.5015	0.1238
	(.9687)	(.1928)	(1.095)	(.2688)	(.7893)	(.1915)	(.9619)	(.2397)
Native American	--	--	--	--	-1.2448	-0.2531	-1.0892	-0.2175
	(--)	(--)	(--)	(--)	(1.422)	(.2126)	(1.159)	(.1773)
Has any disability	-0.3071	-0.0766	-0.1138	-0.0284	-0.5617	-0.1308	-0.4246	-0.0972
	(.3977)	(.0988)	(.4134)	(.1031)	(.3944)	(.0856)	(.3977)	(.0866)
26 years old or older in 89	0.4146	0.1022	0.2876	0.0717	-0.6605	-0.1531*	-0.4802	-0.1099
	(.3636)	(.0880)	(.3942)	(.0977)	(.4107)	(.0872)	(.4486)	(.0964)
Family & SES Background								
Ever married when first enrolled	-0.4236	-0.1054	-0.7069*	-0.1744*	-0.3547	-0.0851	-0.1720	-0.0407
	(.4270)	(.1058)	(.4048)	(.0978)	(.4943)	(.1153)	(.4806)	(.1123)
Has children when first enrolled	0.1302	0.0324	0.2090	0.0522	0.4484	0.1113	0.0781	0.0188
	(.3966)	(.0984)	(.4607)	(.1147)	(.4723)	(.1173)	(.4837)	(.1173)
Parent Ed: some college	0.3543	0.0874	0.3616	0.0900	0.1209	0.0298	0.0161	0.0039
	(.3222)	(.0782)	(.3801)	(.0938)	(.2604)	(.0644)	(.3025)	(.0727)
Parent Ed: BA or higher	-0.2499	-0.0624	-0.2782	-0.0692	0.5728**	0.1414**	0.3200	0.0776
	(.3890)	(.0969)	(.4503)	(.1109)	(.2751)	(.0677)	(.2912)	(.0712)
Dependent in 89-90	0.5127*	0.1264*	-0.1787	-0.0446	0.5064**	0.1229**	0.0284	0.0068
	(.2966)	(.0721)	(.3118)	(.0778)	(.2495)	(.0594)	(.2660)	(.0638)
Ln of total income	-0.2649*	-0.0660*	-0.2625	-0.0656*	0.1659	0.0407	0.2262	0.0543
	(.1450)	(.0362)	(.1590)	(.0398)	(.1232)	(.0302)	(.1398)	(.0333)
Educational Background								
GED	-0.3241	-0.0808	-0.5334	-0.1312*	-0.5871	-0.1360	-0.3358	-0.0777
	(.3432)	(.0852)	(.3239)	(.0771)	(.5420)	(.1156)	(.5326)	(.1182)
Took remediation courses	-0.0697	-0.0174	-0.2115	-0.0527	-0.1740	-0.0423	-0.0379	-0.0091
	(.3849)	(.0961)	(.3914)	(.0970)	(.2935)	(.0706)	(.2901)	(.0693)

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Table 4, Continued: Results from Logistic Regressions Dependent Variable is "Completion of Degree Goal"

Independent Variables	Certificate Students				Associate Students			
	Without Pathways		With Pathways		Without Pathways		With Pathways	
	Coefficient	Mg. Effect	Coefficient	Mg. Effect	Coefficient	Mg. Effect	Coefficient	Mg. Effect
Pathways								
Mid-level intensity[1]	--	--	--	--	--	--	1.1673**	0.2825**
	(--)	(--)	(--)	(--)	(--)	(--)	(.5380)	(.1249)
High level intensity[2]	--	--	-0.6302*	-0.1563**	--	--	1.5235**	0.3485**
	(--)	(--)	(.3240)	(.0790)	(--)	(--)	(.5143)	(.1047)
Interruptions	--	--	-1.6629**	-0.3738**	--	--	-0.4547*	-0.1072*
	(--)	(--)	(.4461)	(.0854)	(--)	(--)	(.2665)	(.0603)
Mid-level working while enrolled	--	--	-0.3677	-0.0913	--	--	-0.2194	-0.0520
	(--)	(--)	(.3390)	(.0834)	(--)	(--)	(.3111)	(.0729)
High level working while enrolled	--	--	-0.6285*	-0.1558*	--	--	-0.1667	-0.0401
	(--)	(--)	(.3291)	(.0802)	(--)	(--)	(.2754)	(.0662)
FTE semesters (square root)	--	--	1.9735**	0.4934**	--	--	0.9749**	0.2339**
	(--)	(--)	(.3861)	(.0965)	(--)	(--)	(.2336)	(.0559)
Constant	2.1426	--	0.4422	--	-1.9030	--	-5.2820**	--
	(1.562)	(--)	(2.067)	(--)	(1.279)	(--)	(1.600)	(--)
Unweighted observations	678		678		871		871	
Pseudo R-squared	0.0362		0.1615		0.1136		0.2361	

Source: Authors' estimates based on Beginning Postsecondary Student Longitudinal Study 1989-1994.

Standard errors in parenthesis. ** Significant at the .05 level; * significant at the .10 level.

[1] Mid-level intensity is defined only for associate students and indicates full-time intensity attendance between 25% and 75% of the enrollment time. [2] High level intensity indicates full-time attendance of at least 75% of the enrollment time for associates, and of 50% for certificates.

Table 5: Three-Year Persistence Rates

	1989-94			1995-98		
Associates	**All[2]**	**Occupational**	**Academic**	**All[2]**	**Occupational**	**Academic**
Persistence[1]	***58.8%***	***51.5%***	***71.5%***	***55.9%***	***52.0%***	***58.2%***
Still Enrolled	31.4%	27.1%	35.5%	32.5%	27.9%	32.5%
Associate Degree	18.5%	17.6%	25.8%	10.6%	12.7%	14.3%
Bachelor's Degree or Transfer	8.8%	6.9%	10.2%	12.8%	11.5%	11.4%
Dropout	***41.3%***	***48.5%***	***28.5%***	***44.1%***	***48.0%***	***41.8%***
After two semesters or less	24.0%	28.5%	15.7%	27.0%	29.7%	20.9%
After three semesters or more	17.3%	20.0%	12.8%	17.1%	18.3%	20.9%

[1] Persistence includes still enrolled, AA/AS degree, or transfer to baccalaureate.

[2] All includes occupational, academic, and undeclared majors.

Source: Authors' estimates based on Beginning Postsecondary Study 1989-94 and 1995-98.

Appendix

Table A: Classification of BPS89 Fields of Study Using Choy and Horn (1992) Categorization

Field of Study	Classification
Liberal Arts	Academic
Philosophy	Academic
Theology	Academic
English	Academic
Art	Academic
Music	Academic
Visual/Performing Arts	Academic
Mathematics	Academic
Biology	Academic
Physical Science	Academic
Physical Science Technology	Occupational
Psychology	Academic
Economics	Academic
History	Academic
Political Science	Academic
Social Science, Other	Academic
Public Administration	Academic
Social Work	Academic
Civil Engineering	Occupational
Electrical Engineering	Occupational
Engineering, Other	Occupational
Engineering Technology	Occupational
Architecture	Academic
Computer Science	Occupational
Computer Technology	Occupational
Lawyer	Academic
Legal Assistant	Academic
Court Reporter	Academic
Accounting	Occupational
Finance	Occupational
Business, Other	Occupational
Secretarial, Bookkeeping	Occupational
Marketing	Occupational
Journalism	Academic
Communications	Academic
Adult Education	Academic
Elementary/Secondary Education	Academic
Education, Other	Academic

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Field of Study	Classification
Dentist	Occupational
Optometry	Occupational
Pharmacy	Occupational
Veterinary	Occupational
Nursing	Occupational
Practical Nurse	Occupational
Medicine, Other	Occupational
Health Technology	Occupational
Agriculture	Occupational
Home Economics	Occupational
Protective Service	Occupational
Cosmetology	Occupational
Construction	Occupational
Mechanics Technology	Occupational
Craftsman	Occupational
Transportation	Occupational
Library Science	Academic
Park Recreation	Academic
Ethnic Studies	Academic
Foreign Language	Academic

The Educational Outcomes of Sub-baccalaureate Occupational Students: Evidence from the 1990s

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Overview

- Motivation
- Research Questions
- Datasets and Samples
- The Educational Outcomes
- Empirical Strategy: Model and Controls
- Discussion of Findings
- Conclusions and Policy Implications

Motivation

- Vocationalization of community colleges: topic of debate for many decades

  However…

  - Literature on community colleges silent on persistence and attainment of students in occupational majors

- Occupational students constitute majority of community colleges' student body

- Reauthorization of Perkins Act in 2003

Research Questions

1. What are the educational outcomes of occupational sub-baccalaureate students?

2. How these educational outcomes compare to those of students pursuing academic studies?

3. Does occupational education bestow advantages, in terms of persistence and completion, for those who pursue it?

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Datasets and Sample

- Datasets
  - Beginning Postsecondary Student Longitudinal Study 1989-94 (BPS89) ⇒ 5 years of data; used for completion
  - Beginning Postsecondary Student Longitudinal Study 1995-98 (BPS96) ⇒ 3 years of data; used for persistence

- Sample: Sub-baccalaureates
  - All students in 2-year colleges
  - Students in 4-year colleges pursuing a sub-baccalaureate degree

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Sub-baccalaureate Students

- 60% of BPS89 sample
- Focus on students' degree goals
  - No degree (9%)
  - Certificate (24%)
  - Associate (67%)
- Occupational majors (Choy & Horn, 1992)
  - 31% of No Degree
  - 80% of Certificates
  - 52% of Associates
  - Students with BA/BS goals less likely to be occupational

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Educational Outcomes

- Dichotomous "completion" "non-completion"
- Defined in relation to students' degree goal
  - Attainment of degree goal or higher degree
  - Transfer considered "completion"
  - Still enrolled considered "non-completion"
- Certificates more likely to achieve goal
- Occupational certificates more likely to complete goal
- Occupational associates: low completion rates

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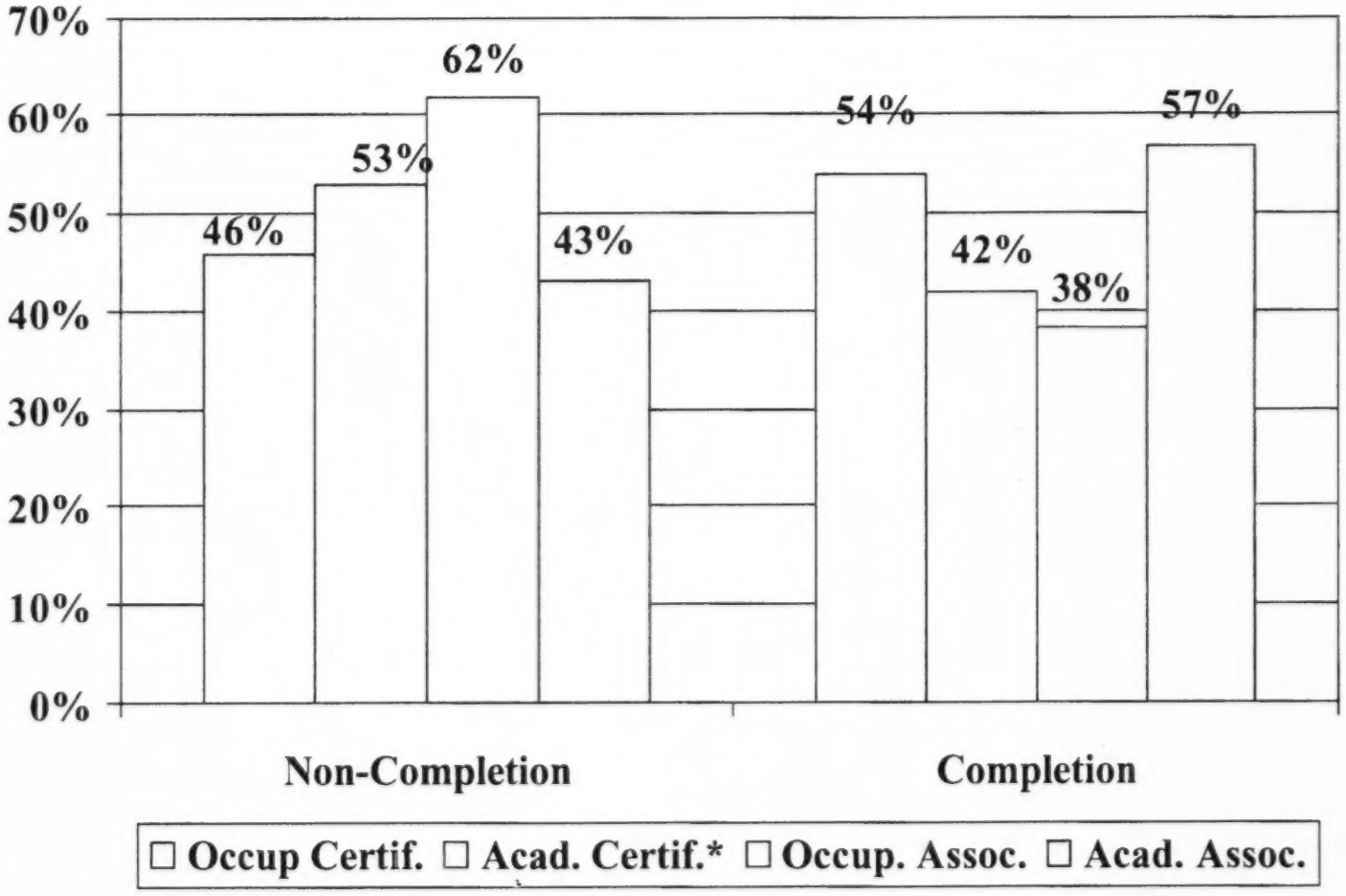
Educational Outcomes (Ctd)



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Empirical Strategy

- Logistic regressions for certificates and associates
- Main independent variable: occupational status
- Controls:
  - Demographics: gender, race/ethnicity, age when first enrolled, disabilities
  - SES: parental education, household income, dependency status, marital status, having children
  - Educational background: GED, remedial courses
  - Pathways: full-time intensity, interruptions to enrollment, working while enrolled, FTE semesters (direct control)

Findings

- Certificates
  - No occupational effect
  - Pathways very significant
- Associates
  - Significant and negative occupational effect
  - Pathways very significant

Model	Raw	Demog.	SES	Educ.	Pathw.	FTE
Effect	-18.8%	-14.6%	-16.8%	-17.3%	-15.6%	-10.9%

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Explaining the Occupational Associate Completion Gap

- Differences between students with AA/AS goals and with BA/BS goals?
  - Variable for degree sought insignificant
  - Negative occupational effect remained
- Changes in definition of completion?
  - Attainment of certificate is "completion" and "transfer" non-completion
  - Negative occupational effect remained

Explaining the Occupational Gap (Ctd.)

- Determinants of AA/AS attainment different than those of transfer/BA/BS attainment?
  - Significant negative occupational effect for transfer/BA/BS
  - Insignificant negative occupational effect for AA/AS
- Occupational students interested in job skills?
  - BPS96 on persistence: occupational effect insignificant
  - Enrolling for job skills: significant negative effect
  - Occupational effect insignificant, but point estimate goes up

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Explaining the Occupational Associate Completion Gap

- Differences between students with AA/AS goals and with BA/BS goals?
- Changes in definition of completion?
- Determinants of AA/AS attainment different than those of transfer/BA/BS attainment?
- Occupational students interested in job skills?

Conclusions

- Effect of enrolling in occupational major differs depending on students' degree goals
- Implications
  - Better inform high school students about demands of college
  - Community colleges should strengthen remediation requirements for occupational students
  - Accountability measures that address students' diverse reasons for enrolling

"Community colleges have yet to figure out and implement optimal approach to provide occupational preparation within structure that rests on academic education"

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